

A new species of the genus *Lasioseius* (Acari: Blattisociidae) inhabiting litter of secondary rainforest in Sumatra, Indonesia

Edwin Javier Quintero-Gutiérrez ^a, Dorothee Sandmann ^b, Orlando Cómbita-Heredia ^{c,d}, Bernhard Klarner ^b, Rahayu Widyastuti^e, Stefan Scheu ^{b,f}

^a Instituto Colombiano Agropecuario (ICA), Subgerencia de Análisis y Diagnóstico, Grupo Red de Análisis y Diagnóstico Fitosanitario, Laboratorio de Análisis y Diagnóstico Fitosanitario de Caldas, Carrera 30 # 65-15, Manizales, Colombia.

^b University of Göttingen, J.F. Blumenbach Institute of Zoology and Anthropology, Untere Karspüle 2, 37073 Göttingen, Germany.

^c Acarology Laboratory, Ohio State University, 1315 Kinnear Rd., Columbus, OH 43212, U.S.A.

^d Centro de Investigación en Acarología, Bogotá, Colombia.

^e Institut Pertanian Bogor, Department of Soil Science and Land Resources, Damarga Campus, Bogor 16680, Indonesia.

^f University of Göttingen, Centre of Biodiversity and Sustainable Land Use, Büsgenweg 1, 37077 Göttingen, Germany.

Original research

ABSTRACT

A new species of blattisociid mites *Lasioseius orangrimbae* n. sp., that belongs to the *floridensis*-group, is described based on females and males from litter and soil samples of secondary rainforest in Sumatra, Indonesia.

Keywords Gamasida; Oriental region; tropical lowland rainforest

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Introduction

Currently, the mite family Blattisociidae (Mesostigmata: Ascoidea) comprises 14 globally distributed genera with *Lasioseius* Berlese 1916 as the most diverse and rich genus. *Lasioseius* includes a total of 206 described species that have been found in different habitats such as soil, grass, moss and litter, but also associated with insects and on plants (Moraes *et al.* 2016). Some species have been widely studied as potential biological control agents (Moraes *et al.* 2015).

Up to date, nine species from five genera of Blattisociidae have been reported for Indonesia i.e., *Blattisocius dentriticus* (Berlese, 1918) from Ambon Island, *Cheiroseius alstoni* (Evans and Hyatt 1960) from Bogor, *Cheiroseius parapodicus* (Berlese, 1916), *Hoploseius cometa* (Berlese, 1910), *Lasioseius sublaevis* Berlese, 1916, and *Platyseius mollicomus* (Berlese, 1916) from Java, *Lasioseius alter* Vitzthum, 1925, *Lasioseius frontalis* Evans and Sheals, 1959 and *Lasioseius polydesmophilus* Evans and Sheals, 1959 from Sumatra. Only *C. alstoni* and *L. alter* have been collected from soil in decaying vegetation and rotting vegetable debris respectively. All the other species have been found associated with insects.

The main goal of this paper is to describe one new species of the genus *Lasioseius* (*Lasioseius*) based on adult specimens (female and male) collected from litter of secondary rainforest in Bukit Duabelas National Park, Jambi Province, Sumatra, Indonesia.

Received 30 January 2020

Accepted 22 April 2020

Published 27 April 2020

Corresponding author
Edwin Javier Quintero-Gutiérrez 
ejquinterog@gmail.com

Academic editor
Faraji, Farid

DOI
10.24349/acarologia/20204371

ISSN 0044-586X (print)
ISSN 2107-7207 (electronic)

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Materials and methods

This study forms part of a large project investigating arthropods of Indonesia, within the framework of the interdisciplinary project “Ecological and socioeconomic functions of tropical lowland rainforest transformation systems (Sumatra, Indonesia)” – EFForTS. For more details on the study region and the experimental design see Drescher *et al.* (2016).

Mites were extracted from soil samples of 16 x 16 cm taken from the core plots of the project with a spade in the Bukit Duabelas National Park, Jambi Province, Sumatra (for exact localities and habitats see “Material examined” section). Litter and topsoil to a depth of 5 cm were extracted separately using the high gradient canister method described by Kempson *et al.* (1963). All specimens were collected in November 2013 by B. Klärner. Mites were initially stored in 70% ethanol, then cleared in 55% lactic acid, in some cases gnathosoma was dissected from idiosoma, and slide preparations were done with Hoyer’s medium.

Photographs and measurements were made using a Nikon Eclipse Ci microscope equipped with phase contrast and connected to a digital camera (Nikon, High-definition Color Camera Head DS-Fi2) controlled by (Nikon, Camera Control Sight DS-L3). Most images were taken in stacks with the focal depth controlled manually. Selected images were combined using Zerene Stacker Version 1.04. In some cases, images captured from different regions of the body were combined using the ‘photomerge’ function in Adobe Photoshop, version 2015 (16.0 or 20150529.r.88; Adobe Systems Inc., San Jose, USA). Digital drawings were prepared with Adobe Illustrator, version CC 2015 (19.0.0), based on mite photographs.

All measurements are given in micrometers (µm) and included in the descriptions as a range (minimum–maximum). Lengths of shields were measured along their midlines; the level in which widths were measured are indicated in brackets. Leg measurements were taken from the proximal margin of the coxa, along of the midline of each segment, to the tip of the claw. Notations of body structures and idiosomal chaetotaxy generally follow Lindquist and Evans (1965). Leg chaetotaxy follows Evans (1963) and Evans and Till (1965). Notations for pore-like structures (gland pores and poroids/lyrifiures) follow the system of Athias-Henriot (1971) for ventral idiosoma and peritrematal shield, and Athias-Henriot (1975) for the dorsal idiosoma.

The holotype (female) and one paratype (male) are deposited in LIPI (Indonesian Institute of Science), Cibinong, Indonesia; the other paratypes in SMNG (Senckenberg Museum), Görlitz, Germany and OSAL (Ohio State Acarology Collection), Columbus, USA.

Results

Systematics

The genus *Lasioseius* includes two subgenera *Lasioseius* (*Lasioseius*) Berlese, 1916 and *Lasioseius* (*Endopodalius*) Christian and Karg, 2006 (Moraza and Linquist 2011). The subgenus *Lasioseius* (*Lasioseius*) includes the following four currently recognized species-groups: the *phytoseioides*-group (Lindquist, 1964) with twenty species, the *porulosus*-group (Walter and Lindquist, 1997) with seven species, the *floridensis*-group (Mineiro *et al.*, 2009) with four species, and the *cassidini*-group with four species (Moraza and Lindquist, 2018).

Based on the key to the world genera and subgenera of Blattisociidae (Moraza and Linquist 2011) and on the diagnosis provided by Moraza and Lindquist (2018) for the species-groups, the species described here forms part of the subgenus *Lasioseius* (*Lasioseius*) and the *floridensis*-group by the combination of the following characters: females with most of the dorsal shield setae tricarinate and moderately long, many of them nearly as long as longitudinal intervals between their bases; posthumeral seta *r4* short and simple, similar to *r2*, and at most half as long as neighboring tricarinate seta *s4*; tarsus II with one midlateral seta *pl2* elongated and reaching nearly to base of pretarsus; leg IV with no tarsal setae longer than tibial segment; podonotal region of female dorsal shield with 21 pairs of setae, including *r4* but excluding

r5; and sternal shield with an anteromedial patch of reticula. The *floridensis*-group currently includes *L. floridensis* Berlese 1916, *L. queenslandicus* (Womersley, 1956), *L. sugawarai* (Ehara, 1964), and *L. latinoamericanus* Mineiro *et al.*, 2009.

Blattisociidae

Lasioseius Berlese

Lasioseius Berlese 1916: 33; Lindquist and Evans 1965: 40; Christian and Karg 2006: 105; Lindquist and Moraza 2010: 4.

Lasioseius orangrimbae n. sp. Quintero-Gutiérrez and Sandmann

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Figures 1–9, 10a

Diagnosis

Female — Dorsal shield with reticulate surface, bearing 36 pairs of setae that are relatively long and tricarinate, except *z1*, *s1*, *r2*, *r4*, *J5* which are smooth and aciculate, *Z3–Z5*, *S4* and *S5* tricarinate and with serrate margin. Soft integument bearing only seven relatively short pairs of setae *r5*, *r6*, *R2–6*; seta *R1* and *UR* series absents. Ventral shields with all setae aciculate and smooth, sternal shield mostly smooth, central region slightly punctate, sparse lateral striations, and with two parallel anteromedian lines between *st1* and *st2*; *st1* in the sternal shield. Genital shield punctate (difficult to discern) with posterior margin truncate; four transversely aligned and elongated platelets between genital and ventrianal shield. Ventrianal shield strongly reticulate, bearing six pairs of preanal setae *ZV2–ZV3*, *JV1–JV3*, *JV4* 10–11; posterior margin slightly narrow at level of *JV4*. Only three pairs of setae *ZV1*, *ZV4* and *JV5* on opisthogastric integument, *JV5* at least twice longer than *ZV1* and *ZV4*. Two pairs of semi-rounded metapodal elements. Spermatheca with a short major duct leading to a weakly sclerotized shallowly funnel-shaped calyx as long as wide from which a long and thin minor duct arise. Tarsus II with *pl2* macrosetae.

Male — Dorsal shield with 38 pairs of setae including *r5–6* (*r6* inserted sometimes on unsclerotized lateral cuticle), unsclerotized lateral cuticle with the setae *R–UR* series absents. Sternogenital shield with five setae *st1–st5*, ventrianal shield bearing six pairs of setae with six pairs of preanal setae, seta *JV5* longer than other preanal setae; *ZV5* in soft opisthogastric

Description

Female (Figures 1–6, 10a) (n = 5)

Idiosomal dorsum — (Figure 1). **Dorsal shield** 340–363 long, 219–239 wide (at level of seta *S1*), covering partially the idiosoma, strongly reticulate, except between the bases of *Z5* and *Z4* being slightly reticulate and with some granulations, reticulations less distinct centrally due to dense internal muscle insertions, lateral margins of soft integument exposed. Dorsal shield bearing 36 pairs of setae of similar length and shape; most setae relatively long and tricarinate, except pairs *z1*, *s1*, *r2*, *r4*, *J5* which are smooth and aciculate; pairs of setae *Z3–Z5*, *S4* and *S5* tricarinate with serrate margin. Unsclerotized lateral cuticle bearing only seven pairs of relatively short setae of similar length *r5*, *r6*, *R2–6*, and a pair of lyrifissures (*RP*) between *R3* and *R4*; *R1* and *UR* series absents. Length of setae: *j1* 20–21, *j2* 18–19, *j3–j4* 25–26, *j5* 22–23, *j6* 23–24, *z1* 7–9, *z2* 20–2, *z3* 30, *z4* 27, *z5* 22, *z6* 22–23, *s1* 11–12, *s2* 7–9, *s3* 27–28, *s4–s6* 29–30, *r2* 7–8, *r3* 28–29, *r4* 7–8, *r5* 9–10, *r6* 7, *J1* 23–24, *J2–J4* 24–25, *J5* 11–12, *Z1* 28–29, *Z2* 29–30, *Z3* 36, *Z4* 46–47, *Z5* 41–42, *S1–S3* 25–27, *R2–R3* 9–10, *R4–R6* 11–12. Dorsal shield with 22 pairs of pore-like structures, including six pairs of gland openings (*gd1–2*, *gd4*, *gd6*, *gd7* and *gd9*) and 16 pairs of poroids.

Idiosomal venter — (Figures 2, 3a–d). All setae aciculate and smooth. **Tritosternum** with columnar base and pair of completely free pilose laciniae. Pre-sternal region little sclerotized, punctate and transversely striate (Figures 3a). **Sternal shield** 253–260 long, 170–174 wide (at level of *st2*) mostly smooth, central region slightly punctate, difficult to discern (Figures

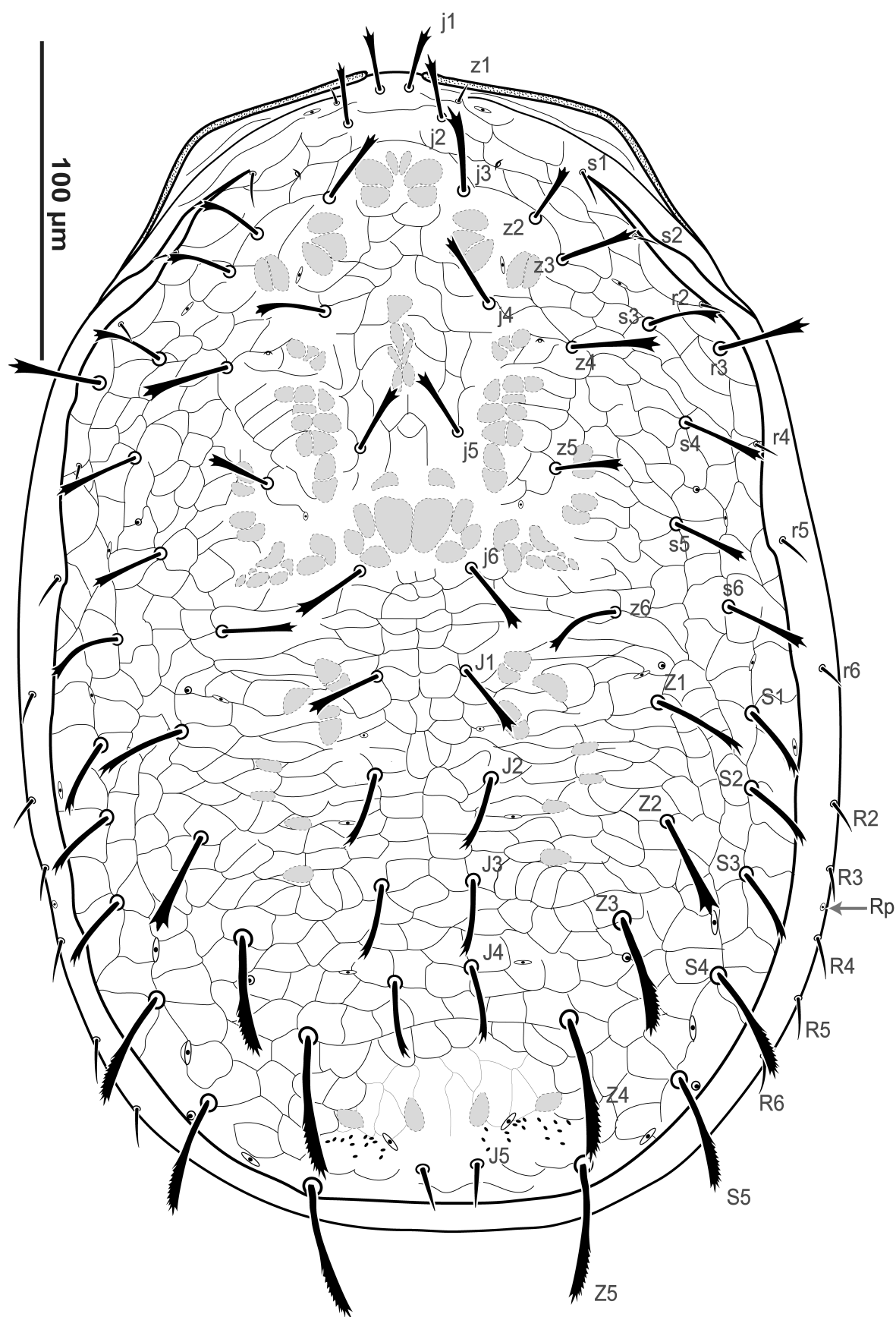


Figure 1 *Lasioseius orangrimbae* n. sp., adult female: Dorsal idiosoma. Note absence of setae *R1* and *UR* series.

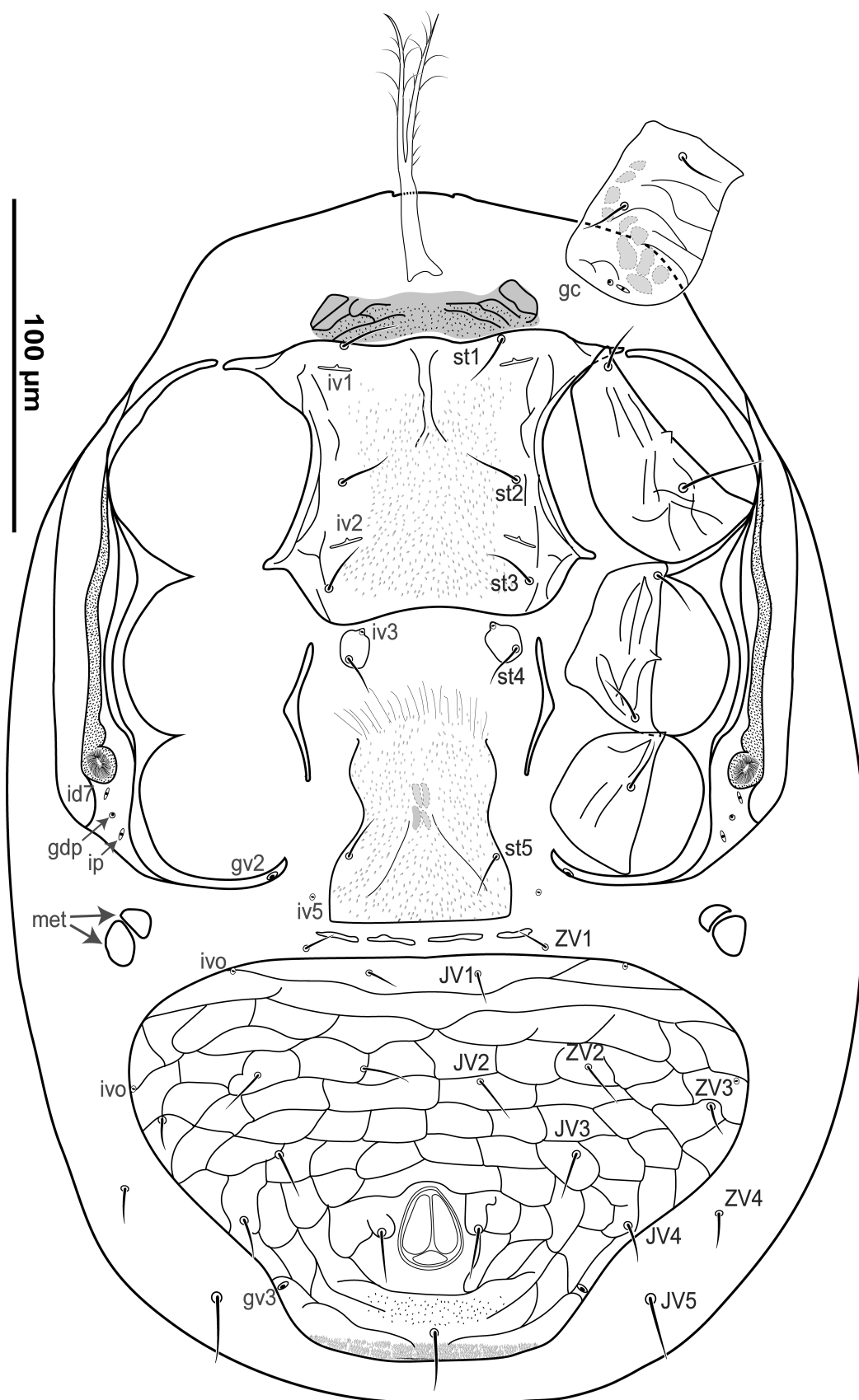


Figure 2 *Lasioseius orangrimbae* n. sp., adult female: Ventral idiosoma.

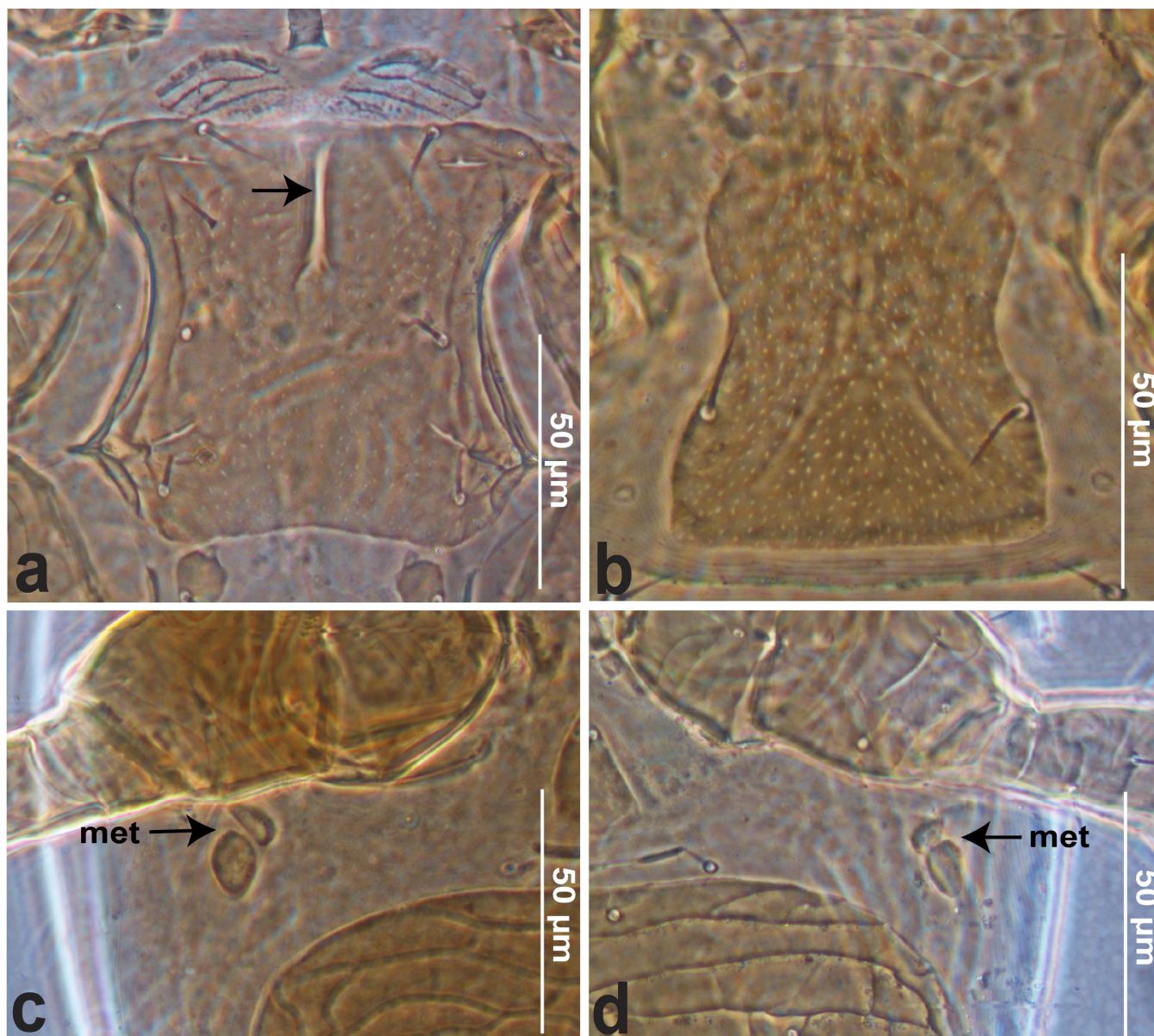


Figure 3 *Lasioseius orangrimbae* n. sp., adult female: a – Pre-sternal region and sternal shield showing the punctuated area, arrow showing the narrow anteromedian strip; b – Genital shield with punctuations; c, d – Metapodal platelets, variant forms.

3a), with sparse lateral striations and with two parallel anteromedian lines between *st1* and *st2* (Figures 3a, see arrow), bearing three pairs of setae *st1*–*st3* (15–16) and two pairs of slit-like poroids *iv1*–*2*, oblique. Posterior portion of endopodal plate represented by a triradiate fragment between coxae III–IV. Metasternal plates roundish, with *st4* (16) and a pair of lyrifissures (*iv3*). **Genital shield** 72–75 long, 55–58 wide (at level of *st5*), evenly punctated, but difficult to discern (Figure 3b); posterior margin truncate, shield bearing one pair of setae *st5* (15–16), slit-like poroids *iv5* on unsclerotized cuticle and posterolaterad of *st5*; in front of the posterior margin four transversely aligned elongate platelets. **Exopodal shield** narrow, between coxa I–IV long and fused posteriorly (at level to the coxa IV) with the peritremal–parapodal shields. **Peritrematal shield** smooth, anteriorly fused with dorsal shield at level of the setae *st1*, fused posteriorly with the exopodal–parapodal shields; bearing pairs of poroids *id3*, *gd3*, *id7*, *gdp* and

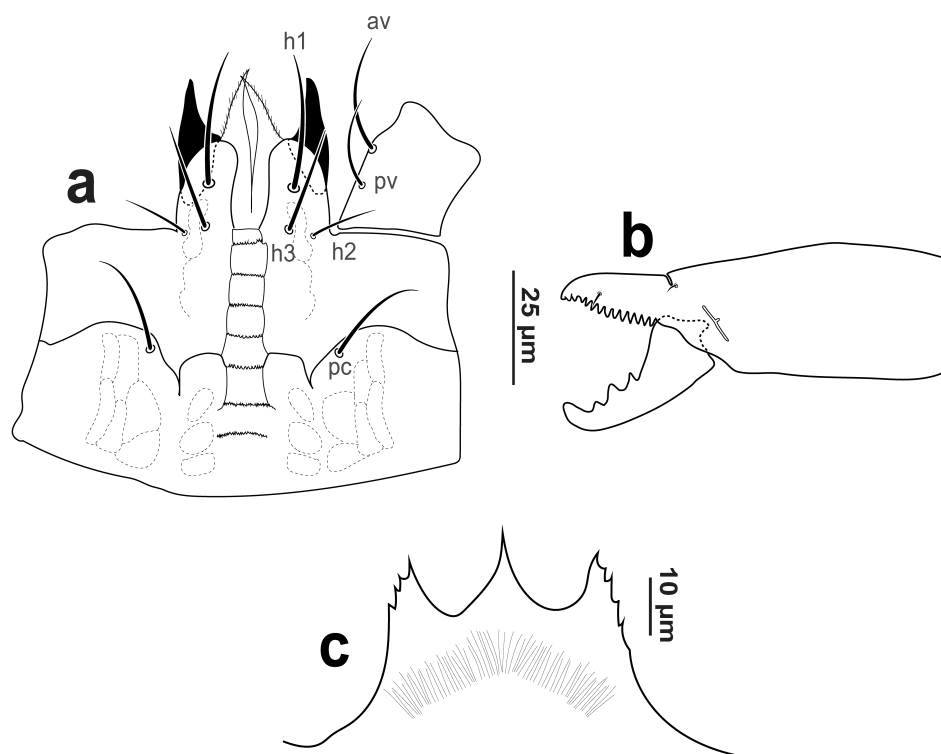


Figure 4 *Lasioseius orangrimbae* n. sp., adult female: a – Subcapitulum; b – Chelicera (antiaxial view); c – Gnathotectum.

ip. **Ventrianal shield** wider 312–316 (at level of *ZV3*) than long 194–204, posterior margin slightly narrow at level of *JV4*; strongly reticulate and punctate anterior to the postanal seta; shield with six pairs of setae *ZV2* 15–16, *ZV3* 7, *JV1* 11–12, *JV2* 15–16, *JV3* 12–13 and *JV4* 10–11 additionally to the circumanal setae (postanal seta slightly longer 21–22 than para-anal setae 15–16). Further, with one pair of marginal pores (*gv3*) posterolaterad of para-anal setae and two pairs of poroids (*ivo*). **Soft opisthogastric cuticle** bearing only three pairs of setae, *JV5* 20–21 twice longer than *ZV1* and *ZV4* 10–11, with two pairs of semi-rounded metapodal platelets (*met*) well developed (Figures 3c–d).

Gnathosoma — (Figures 4a–c). **Subcapitulum** (Figure 4a) corniculi well sclerotized, elongated and horn-like. Internal malae lanceolate, densely fimbriated, with apices slightly beyond of the corniculi. Deutosternum with eight transverse rows of denticles with first row (most distal), from second to seventh rows with 10–15 denticles, the first seven lines are connected by the lateral subparallel deutosternal lines, eighth line (most proximal) extending beyond lateral deutosternal lines and with 20–23 denticles; with smooth lines laterad of delineating deutosternal lines at region between fifth and sixth transverse lines; subcapitular setae smooth and aciculate, *h1* and *h3* 32 longer than *h2* 23 and *pc* 29. **Chelicerae** (Figure 4b). Fixed digit with 13 small teeth plus one distal hook-like tooth, and a setiform *pilus dentilus*; dorsal and antiaxial lyrifissures as well as dorsal setae distinct; mobile digit with three large teeth and one large distal tooth. **Gnathotectum** (Figure. 4c) with three anterior projections, two serrate lateral projections and one acuminate middle process longer than the lateral ones (not serrate).

Legs — (Figures 5a–d) Lengths: I 303–307, II 255–261, III 220–224, IV 298–304. Chaetotaxy/setation—Coxae: I: 0, 0/1, 0/1, 0; II: 0, 0/1, 0/1, 0; III: 0, 0/1, 0/1, 0; IV: 0, 0/0, 0/1, 0; trochanters: I: 1, 0/1, 1/2, 1; II: 1, 0/1, 0/2, 1; III: 1, 1/1, 0/2, 0; IV: 1, 1/1, 0/2, 0; femora:

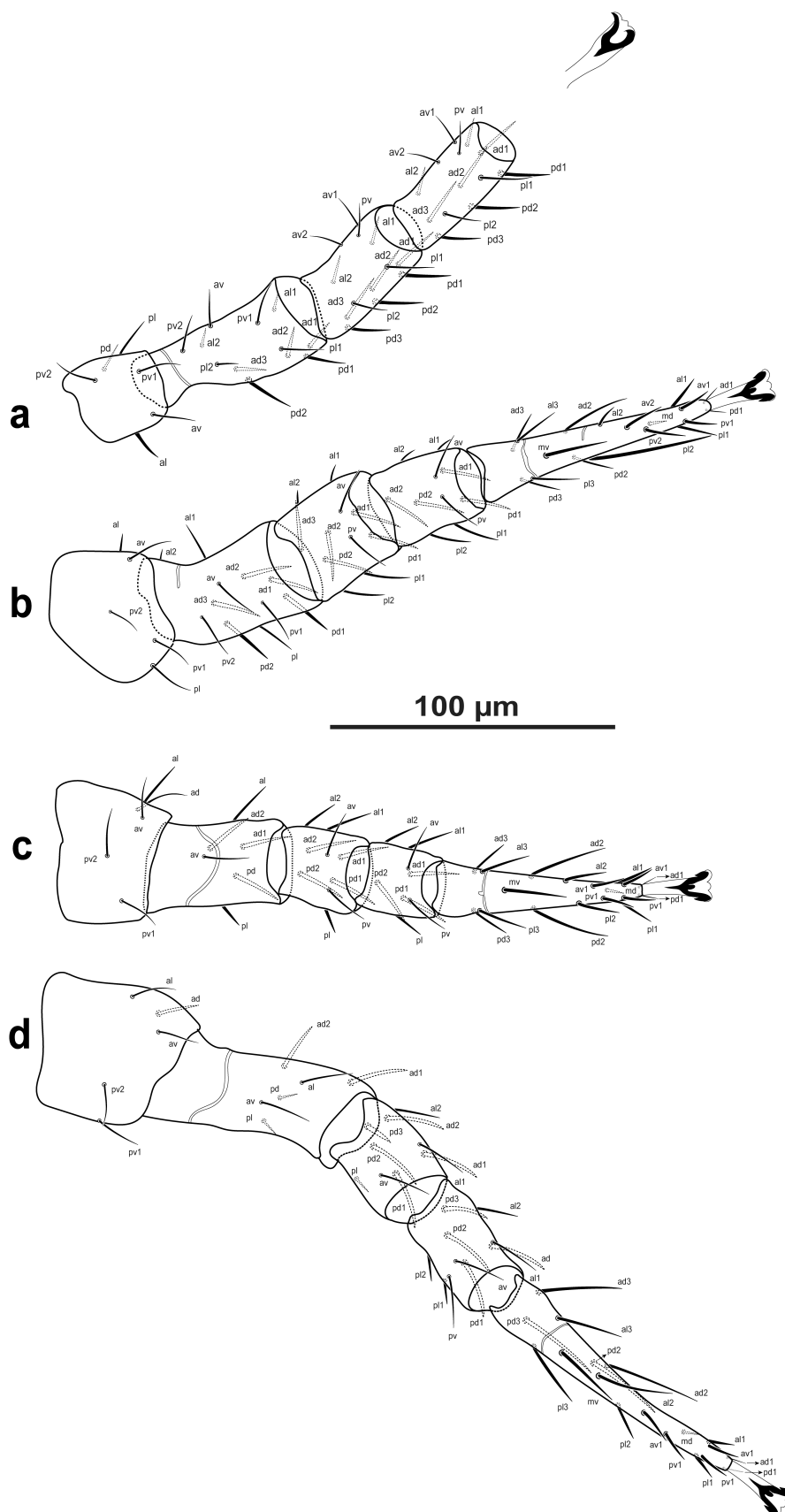


Figure 5 *Lasioseius orangrimbae* n. sp., adult female: a–d – legs I–IV, respectively.

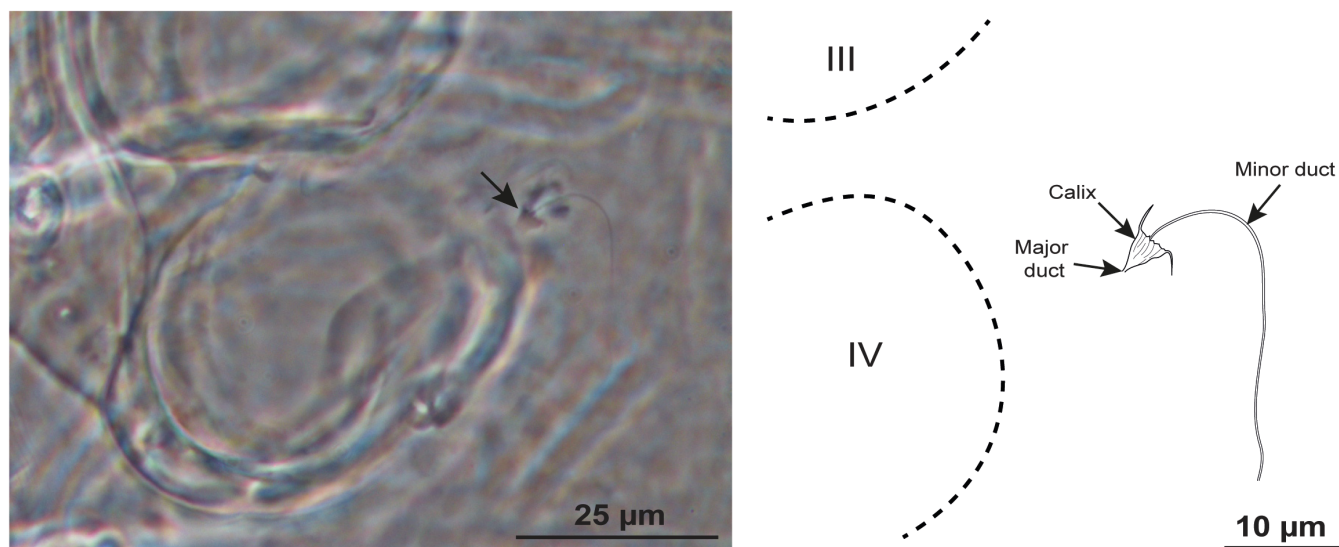


Figure 6 *Lasioseius orangrimbae* n. sp., adult female: spermathecal apparatus.

I: 2, 3/1, 2/2, 2; II: 2, 3/1, 2/2, 1; III: 1, 2/1, 1/0, 1; IV: 1, 2/1, 1/0, 1; genua: I: 2, 3/2, 3/1, 2; II: 2, 3/1, 2/1, 2; III: 2, 2/1, 2/1, 1; IV: 2, 2/1, 3/0, 1; tibia: I: 2, 3/2, 3/1, 2; II: 2, 2/1, 2/1, 2; III: 2, 1/1, 2/1, 1; IV: 2, 1/1, 3/1, 2; tarsi I: not counted, II: 18; III: 18; IV: 18. All legs I–IV with pretarsi, including a pair of claws and a pulvillus with median lobe rounded. Legs with all setae aciculate and smooth. Legs I–IV with most of the dorsal setae in femur–tibia slightly thicker than ventral setae. The most of setae in the tarsus I–IV moderately longer and/or stout than other segments. Tarsi II–IV with seta *md* 3.2 times longer than *mv*. Leg II with *al* setae in femur–tibia shorter than *pl* setae (*al1* in femur II is long). Tarsus II with *pl2* macrosetae (5.2 times longer than *al2*) (Figure 10a) and *pd2* moderately longer than *ad2*. Legs III–IV with *pl* setae in femur–tibia shorter than *pl* setae. Tarsus IV with *al2* slightly longer than *pl2*.

Spermathecal apparatus — (Figure 6). With a short major duct leading to a weakly sclerotized shallowly funnel-shaped calyx as long as wide from which a long 33 and thin minor duct arise with terminus duct indiscernible in specimens at hand.

Male (Figures 7–9) ($n = 3$)

Idiosomal dorsum — (Figures 7a–b). **Dorsal shield** 268–275 long, 178–180 wide at level of setae *St1*, chaetotaxy as in female but bearing two more pairs of setae (*r5*–*6*, Figure 7a) for a total 38 pairs of setae (*r6* inserted on unsclerotized lateral cuticle in one of the three males, Figure 7b), other setae from *R*-series absent; dorsal setae slightly shorter than in female. Poroidotaxy, adenotaxy and ornamentation identical to that of female.

Idiosomal venter — (Figure 8). Similar to female except the following: **Sternigenital shield** 130–134 long, 58–61 wide at level between *st2*; bearing five pairs of simple setae (*st1*–*5*). **Ventrianal shield** with six pairs of setae (*JV1*–*3*, *JV5*, *ZV1*–*2*), excluding three circum-anal setae, *JV5* longer than other preanal setae; *ZV5* in soft opisthogastric integument.

Gnathosoma — (Figures 9a–b). As in female except the following: **Chelicerae** (Figure 9a); fixed digit with 12 small teeth plus one distally hook-like tooth and a setiform *pilus dentilus*; dorsal and antiaxial lyrifissures and dorsal setae distinct; mobile digit with a single tooth slightly directed forward and distally hook-like; with a slightly curved spermadactyl. **Gnathotectum** (Figure 9b) anteromedian region of epistome convex, with variably denticulate extensions.

Legs — Similar to those of female. Lengths: I 255–260, II 232–236, III 182–190, IV 264–268. Tarsus II with *pl2* macrosetae.

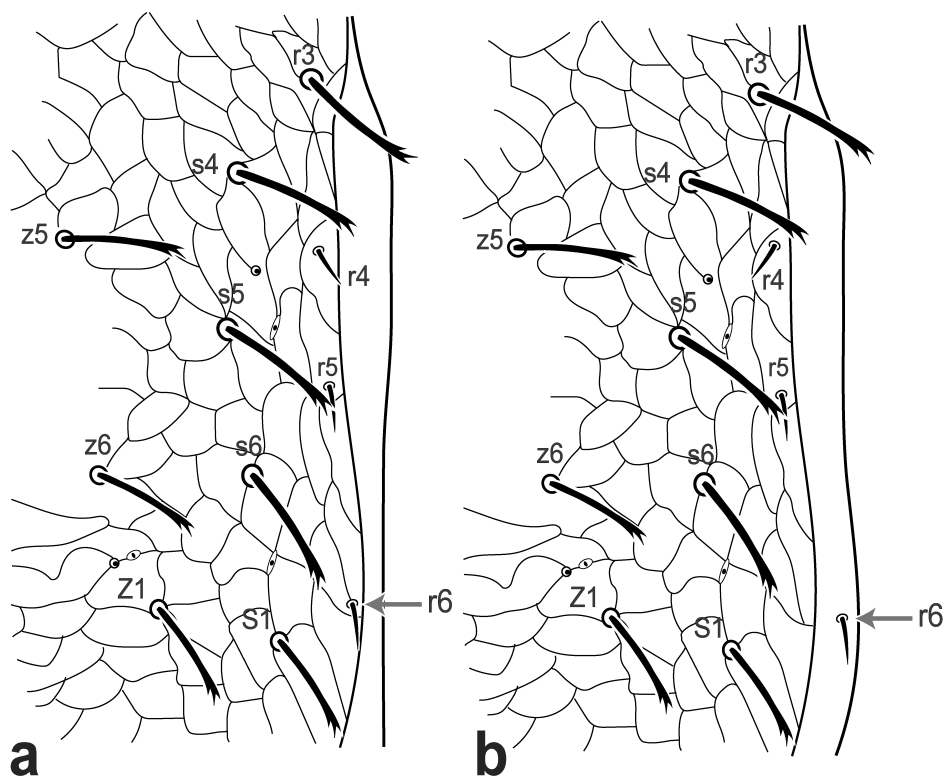


Figure 7 *Lasioseius orangrimbae* n. sp., adult male, lateral region of the dorsal shield, showing the insertion of the seta *r6*: a Seta *r6* in the dorsal shield; b – Seta *r6* in unsclerotized lateral cuticle. No scale.

Type material and depository

Indonesia, Sumatra, holotype and all paratypes from Bukit Duabelas National Park, litter from secondary rainforest, research site BF1a, S 01°59'42.5", E 102°45'08.1", 83 m a.s.l.

Holotype: • 1♀, deposited at LIPI (OSAL 00124869); **Paratypes:** • 2♀ deposited at SMNG (OSAL 00124865 SMNG 2020 / 61895/1, OSAL 00124867 SMNG 2020 / 61895/3). • 2♀ deposited at OSAL, (OSAL 00124868, 00124870). • 1♂ deposited at LIPI, (OSAL 00124864). • 1♂ deposited at SMNG (OSAL 00124866 SMNG 2020 / 61895/2). • 1♂ deposited at OSAL (OSAL 00124863). All specimens were collected in November 2013 by B. Klarner. Additional photos of the species (ECOTAX_ID: 424404) are deposited in Ecotaxonomy database at www.ecotaxonomy.org.

Etymology

The epithet *orangrimbae* refers to forest-dwelling people “Orang Rimba” living in the sampling region.

Remarks

Differential characters: *Lasioseius orangrimbae* n. sp., significantly differs from the other species in the *floridensis*-group by the smaller body size in females and males (Females: 268–275 long, 178–180 wide, Males: 268–275 long, 178–180 wide) compared to *L. floridensis* (F: 433–450 long, 238–255 wide, M: 300–325 long, 190–208 wide), *L. latinoamericanus* (F: 402–422 long, 205–212 wide, M: 302–315 long, 168–171 wide), *L. queenslandicus* (F: 430 long, 260 wide, M: 317–320 long, wide not reported), and *L. sugawarai* (F: 430 long, 270 wide, M: unknow). Additionally, the spermathecal apparatus in females of *L. orangrimbae*

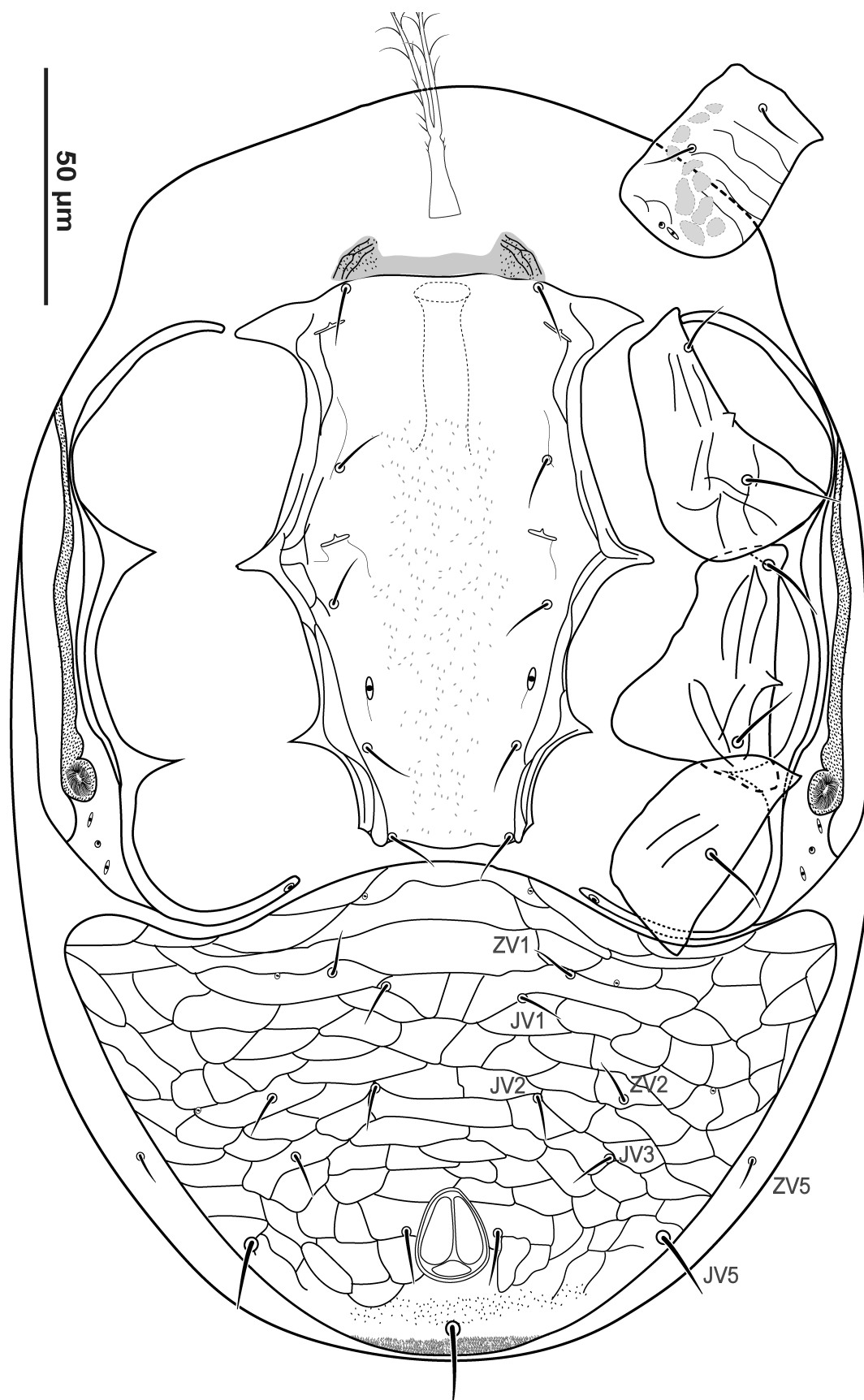


Figure 8 *Lasioseius orangrimbae* n. sp., adult male: Ventral idiosoma.

n. sp., has a sclerotized, funnel-shaped calyx that is as long as wide without conspicuous vesicle, in *L. floridensis* the spermathecal apparatus is sclerotized, shallowly funnel-shaped calyx with a conspicuous vesicle and a long, relatively thick minor duct; in *L. latinoamericanus* the spermathecal apparatus has a densely sclerotized region (embolus) with a slender funnel-shaped calyx with a conspicuous long vesicle and a very thin minor duct; in *L. sugawarai* the spermathecal apparatus is small, weakly sclerotized, bulbous and without discernible minor duct, and in *L. queenslandicus* the spermathecal apparatus is bifurcated after leaving the solenostome with a weakly sclerotized, tubular calyx and a relatively short thick minor.

Also, females of *L. orangrimbae n. sp.* differ from the those of the other species in the *floridensis*-group in having a total of seven pairs of marginal setae on soft cuticle (*r*5–6, *R*2–6) with *R*1 and *UR* setae absent, while *L. floridensis*, *L. latinoamericanus* and *L. queenslandicus* have eight pairs of marginal setae (*r*5–6, *R*1–6) with setae *UR* present, and *L. sugawarai* has eleven pairs of marginal setae (*r*5–6, *R*1–7) with two pair of *UR* setae. In addition, females *L. orangrimbae n. sp.*, have only three pairs of setae in the opisthogastric cuticle (*JV*5, *ZV*1, *ZV*4), compared to *L. floridensis* and *L. latinoamericanus* which have six pairs (*JV*4–5, *ZV*3–5) and (*ZV*1, *ZV*3–4, *JV*4–5), respectively; *L. latinoamericanus* has seven pairs (*ZV*1, *ZV*3–*ZV*5, *JV*4–*JV*5, and a pair of submarginal *UR*) and *L. sugawarai* has five pairs (*JV*4–5, *ZV*1, *ZV*3–4). Finally, males of *L. orangrimbae n. sp.*, do not have marginal setae (except *r*6 in one of the three examined males), whereas males in *L. floridensis* have five pairs of marginal setae (*R*2–6), *L. queenslandicus* two pairs (*R*2, *R*5) and *L. latinoamericanus* six pairs (*R*1–6).

Discussion

Five species of *Lasioseius* have been previously described from Sumatra *L. sublaevis* *L. alter*, *L. frontalis*, *L. polydesmophilus* and *L. angustus*. For *L. sublaevis* it is not possible to compare or establish the subgenus or species group because the description is very short. Additionally, Christian and Karg (2006) did not include this species in their study. *Lasioseius alter*, *L. frontalis*, and *L. polydesmophilus* are not closely related to *L. orangrimbae n. sp.*, because they belong to the subgenus *Lasioseius* (*Endopodalius*) Christian and Karg, 2006. Finally, *L. angustus* was described based only on males and also seems to belong to the subgenus *Lasioseius* (*Endopodalius*).

When examining our specimens with the key to the species of *Lasioseius* provided by Christian and Karg (2006) we ended in a similar way as reported in Britto *et al.* (2011). These authors reported that when they determined their specimens of *L. floridensis* with this key, it led them to the subgenus *Crinidens*, then to key 6 for their *ometes*-complex having five pairs

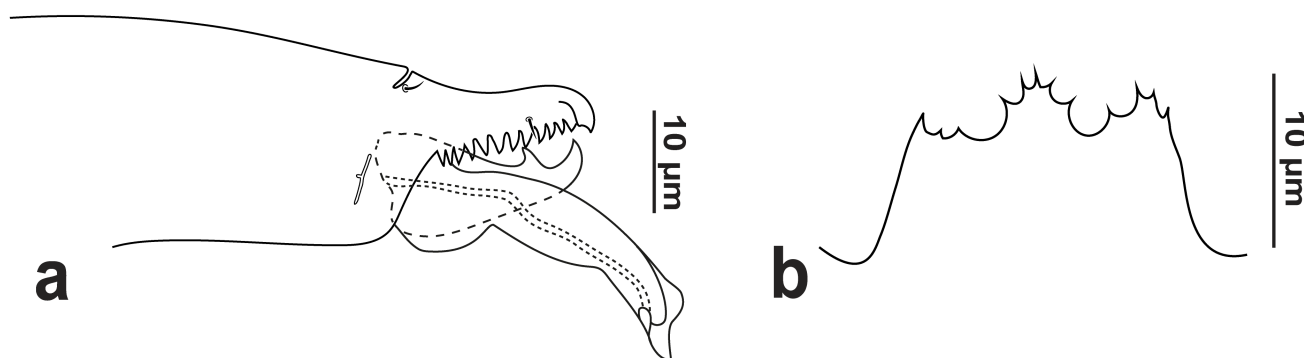


Figure 9 *Lasioseius orangrimbae n. sp.*, adult male: a – Chelicera (antiaxial view); b – Gnathotectum.

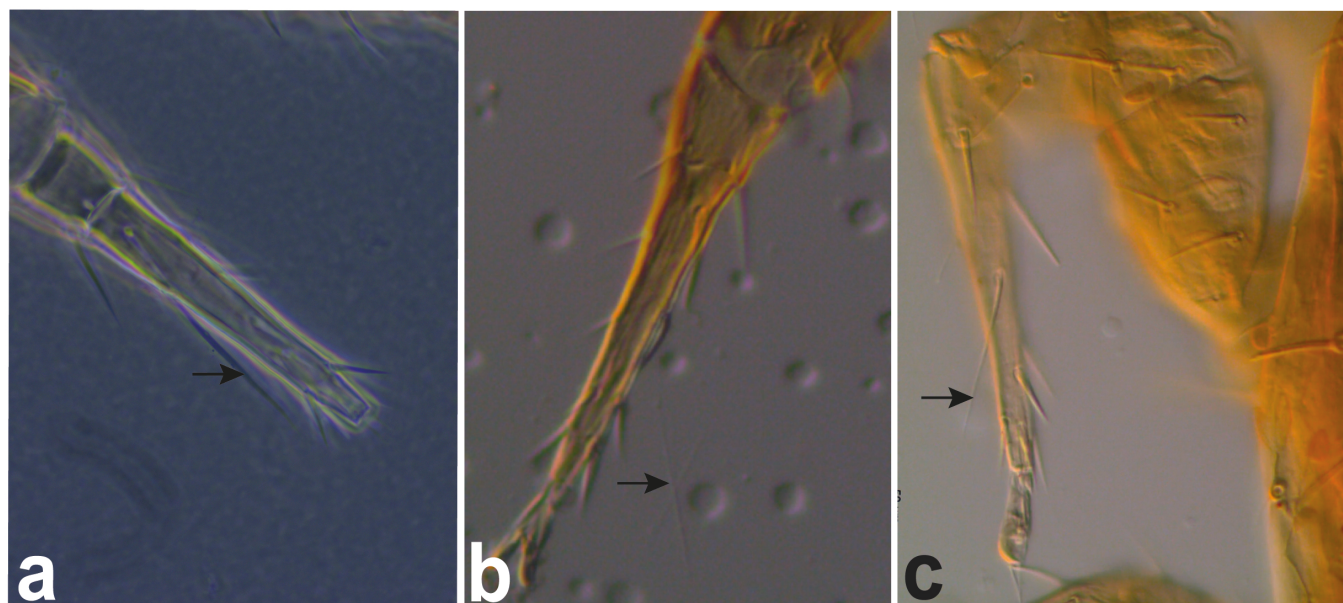


Figure 10 Tarsus II with macroseta *pl2* in adult females: a – *Lasioseius orangrimbae* n. sp.; b – *Lasioseius laciniatus*; c – *Lasioseius tricuspidis*. No scale. Images b–c taken from VIRMISCO (Decker *et al.* 2018).

of setae on the ventrianal shield. In our case ending in the subgenus *Crinidens* for having most dorsal setae tricarinate, then to the *Lasioseius-ometisimilis*-complex key 5 for having 6 setae on the ventrianal shield, and at the end to the cuplet 21-22 to the species *L. laciniatus* Christian and Karg, 2006, and *L. tricuspidis* Christian and Karg, 2006 for having the following characters: a normal number of dorsal setae (not reduced), two pairs of metapodal plates, margins of the tectum with three clear “branches” with medial “branch” as long as the lateral ones which have serrations, most of the dorsal setae tricarinate and dorsal setae not as long to reach the base of the next setae, sternal seta *st1* on the sternal shield, ventrianal shield slightly wider than longer, post anal seta not long. However, the tectum shape in *L. laciniatus* and *L. tricuspidis* do not resemble the one of *L. orangrimbae* n. sp., in *L. orangrimbae* n. sp. the lateral processes of the tectum are serrate with the middle process longer than the lateral ones, whereas in *L. laciniatus* the lateral processes of the tectum are serrate with the middle one shorter than the lateral ones, and in *L. tricuspidis* the lateral processes are three-pronged with the middle one little longer than the lateral ones. Additionally, *L. orangrimbae* has a well-developed anteromedial patch in the sternal shield, which is absent in *L. laciniatus* and *L. tricuspidis*.

Finally, we would like to emphasize that *L. orangrimbae* n. sp., fits well the characters stated in Moraza and Lindquist (2018: 68, entry 4) for the *floridensis*-group “Dorsal shield with post-humeral seta *r4* short, simple, similar to *r2*, and not more than half as long as tricarinate seta *s4* neighboring it medially; most dorsal setae tricarinate and moderately long, nearly as long as longitudinal intervals between their bases; anterior pair of sternal setae on weakly sclerotized presternal area, just before anterior margin of sternal shield; sternal shield with anteromedial patch of reticula; tarsus II with one midlateral seta *pl2* elongated and reaching nearly to base of pretarsus”, except the character “anterior pair of sternal setae on weakly sclerotized presternal area”. However, when we compared our specimens with the key to the species of *Lasioseius* in Christian and Karg (2006), we noticed that some species in the subgenus *Lasioseius* (*Crinidens*) sensu Christian and Karg, 2006 especially the species in the part of the key 5 (*Lasioseius-ometisimilis*-complex) number 11(14) that states “The first pair of sternal setae localized anteriorly to the shield” may fall in the *floridensis*-group because they all fit the characters of the group but some of them do not have the “sternal shield with

anteromedial patch of reticula”, and it is not clear if all species of *Lasioseius-ometisimilis*-complex also have “tarsus II with one midlateral seta *pl2* elongated and reaching nearly to base of pretarsus”. Examining holotype images of *L. laciniatus* and *L. tricuspis* in VIRMISCO (Decker *et al.* 2018), we noticed that *L. laciniatus* and *L. tricuspis* have the macroseta *pl2* in tarsus II (Figures 10b–c). Therefore, it is not clear why the *floridensis*-group does not include species of the subgenus *Lasioseius* (*Crinidens*) sensu Christian and Karg (2006), or where those species would fall under the species-group key presented in Moraza and Lindquist (2018).

All the previous suggests that the subgenus *Lasioseius* (*Crinidens*) sensu Christian and Karg (2006) needs to be revised considering if certain species may belong to the *floridensis*-group, or if with a slight shift of characters the *floridensis*-group may be split or expanded to include other species.

Acknowledgements

Thanks to Bruce Halliday and Diana Rueda-Ramirez for help with literature. Thanks to the State Ministry of Research and Technology of Indonesia (RISTEK) for the research permit, the Indonesian Institute of Sciences (LIPI) and Ministry of Forestry (PHKA) for the collection permit, the village heads, local site owners, PT REKI and Bukit Duabelas National Park for granting access to their properties, and the many colleagues and helpers for support in the field. Financial support was provided by the German Research Foundation (DFG) in the framework of the collaborative German – Indonesian research project CRC990 (EFForTS).

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